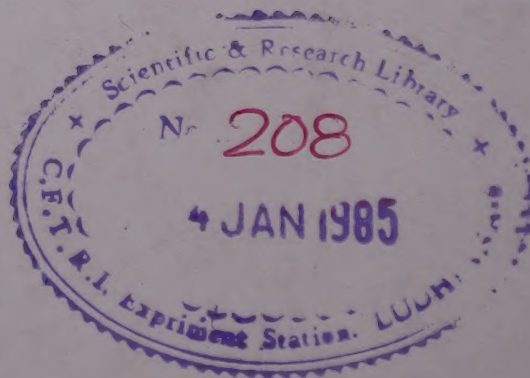


Symposium on FLAVOURS AND THEIR INDUSTRIAL APPLICATIONS

RRL JAMMU
May 15-16 1982

Organised by
Regional Research Laboratory, Jammu-Tawi
With the Co-operation of
Perfumes & Flavours Association of India
Bombay

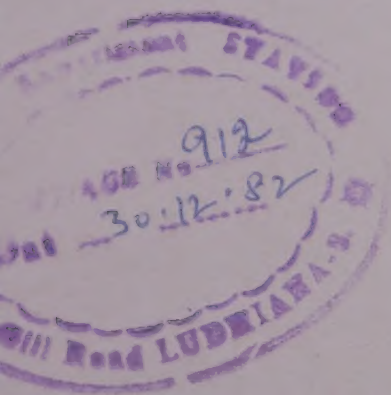


PERFUMES & FLAVOURS ASSOCIATION OF INDIA

NAVINCHANDRA RANCHHODDAS SHAH HALL

2-B, Court Chambers, 35, Sir Vithaldas Thakersey Marg,
BOMBAY 400 020

Phone : 295875



27th April, 1982

MESSAGE

It gives me great pleasure that the Regional Research Laboratory, Jammu, in collaboration with Pafai, is organising a Symposium on "Flavours and their Industrial Application" at Jammu on the 15th & 16th May, 1982. It is noteworthy that so far no such Symposium on the specialised use of flavours has been held and this is the first of its kind.

I am sure that under the able guidance of Dr C.K. Atal and with the Keynote address from a scientist of the calibre of Dr Sukh Dev, the Symposium will get an added impetus and the topic will be discussed in all its aspects and practical solutions to the various problems in the use of flavours would be found.

I wish the Symposium all success.

YASHWANT J. GORE

President

Perfumes & Flavours Association Of India

With a view to promoting unity and fraternity amongst the traders and dealers in perfumery and flavour chemicals in Greater Bombay, the Perfumery Raw Materials Trade Association (PRMTA) was established in 1949.

Among the founder members were persons of high standing like the late Mr Keshavlal Bodani, and Mr Kantilal N. Shah who served as the Secretary of the Association for 25 years and was elected its President in 1973-75.

Though the business problems in 1950 were different from those faced by the industry today, the Association has been effectively taking them up with the authorities concerned—be it import policy, sales tax or other matters.

Another major requirement was to bring people in the trade and industry together on one platform, which the PRMTA successfully brought about.

From its humble beginnings it has now grown into a premier body. In order to make it more representative and enlarge its scope to cover manufacturers and dealers all over India in both the perfumery and flavour trade and industry, the constitution was amended and from the 15th August, 1971, it began to function as an all-India body under its new name "Perfumes & Flavours Association of India" (Pafai). It has now the status of being the only representative organisation in the country covering both the perfumery and flavour trade and industry and has a membership of 500 on its rolls.

Thanks to the munificent donations from its members and in particular M/s N. R. Shah & Company and M/s Goldensun Manufacturing Company who have donated quite generously the Association is now housed in its own premises. M/s S. H. Kelkar & Company Ltd. have given generous donation for setting up a technical library.

With a view to making Pafai an effective and motivating organisation to serve the perfumery industry and to enable its members to manufacture quality products for local and export sales, it was decided to undertake the following activities :

1. To establish liaison with similar international bodies to develop trading in perfumery materials like essential oils and perfumery compounds, particularly in West Asian and Asian countries;
2. To set up a technical cell which would function as an advisory body for solving technical problems faced by the members of the Association and act as a technical liaison body between the trade and the various Government research laboratories;
3. To organise from time to time seminars on subjects dear to the perfumery industry such as development of new essential oils, aroma chemicals, standardization and quality consciousness and to educate members on development of the industry in foreign countries;
4. To have a library of standard reference books, magazines and bulletins for the benefit of manufacturers and researchers; and
5. To organise perfumery courses and lectures on the subjects to attract more and more people and to give vocational guidance to the new-comers in the perfumery business.

So far five seminars have been conducted and plans are now afoot for the sixth seminar to be held in December 1982. The seminars have become very popular and are usually attended by large number of delegates from India and abroad.

Regional Research Laboratory, Jammu

The history of Regional Research Laboratory, Jammu goes back to November, 1941, when it started functioning as a small research unit under Jammu & Kashmir Government. The Laboratory was headed by Late Col. Sir R.N. Chopra, who is considered father of Pharmacology in India. It was then known as Drug Research Laboratory and its activities related to survey, chemical investigation and pharmacological screening of medicinal and aromatic plants. Later cultivation of these plants was taken up in farms and a commercial unit for manufacture of pharmaceuticals was added.

The research unit was formally taken over by Council of Scientific & Industrial Research in December, 1957 and renamed as Regional Research Laboratory. This change in name was necessary as the objectives of the Laboratory were widened to include research programmes related to the utilization of all natural resources, may these be of plant, animal or mineral origin.

The initial few years were spent in completion of take-over formalities, planning the expansion of the Laboratory in terms of research programmes, and matching facilities of staff, buildings and equipment. In sixties new laboratory blocks, pilot plants, workshops, library and store buildings were constructed. This decade also saw the establishment of new sections, to carry out research programmes related to utilization of natural resources of plant, animal and mineral origin. Steps were taken to establish an experimental farm to develop agro-technology for the growing of medicinal and aromatic plants, which were hitherto collected from wild sources. Like other cash crops an improvement programme to develop better varieties of the plants was also taken up. It was in this decade that latest literature pertaining to the new research programmes initiated by RRL, Jammu was acquired and a nucleus of workshop and pilot plants was established.

A decision of far reaching significance was taken to establish a Branch Laboratory at Srinagar. This branch laboratory grew from scratch. The building was constructed and some of the R & D programmes relating to temperate economic plants were taken up.

In seventies infra-structural facilities were further strengthened. The facilities in pilot plants and workshops were improved. The improvement in workshops has started paying dividends by way of fabrication of various equipments and plants for internal use as well as for outside parties on turn-key basis. Greatest attention was paid in acquiring sophisticated instruments. Some of these instruments like Mass Spectrometer coupled with GLC and computer facility, FT-multinuclear NMR, X-ray Diffractometer, etc., are available in the Institute only in this part of the country.

In early seventies RRL, Jammu also conducted many exercises at various levels to identify problems of immediate socio-economic importance to the society. These were split into small investigation/projects, for execution within time bound programme. Some promising projects based on investigations conducted in sixties were taken up for extensive studies. The advantages of this changed policy are reflected in the increase in the number of consultancies taken and projects sponsored by Industry as well as the turn-key jobs handled.

RRL is multidisciplinary Laboratory and it is difficult to mention all the achievements made so far. In the field of R & D work on essential oils and aroma chemicals, some of which are used as flavours, the Laboratory has gained the distinction of being the premier Institute in the country. The Laboratory introduced Japanese mint in Jammu in late fifties. Technology for its cultivation, distillation of oil, extraction of menthol, making bolder crystals of menthol and conversion of marc into boards was

developed in the next two decades. As a result of these efforts, Japanese mint is now grown in many parts of the country and this industry is worth Rs 100 million providing employment to thousands of people and saving valuable foreign exchange. Country's entire demand of menthol and mint oil is now met from indigenous production.

Another product of interest to flavour industry, which has received the attention is vanillin. RRL, Jammu has developed know-how for the production of vanillin from sawdust, a waste product of joinery mills and also eugenol, for which has been developed a cheap source by way of a variety of *Ocimum* (named *Clocimum*), the oil of which has eugenol as a major constituent. The plant breeders in RRL have developed many more varieties of *Ocimum* and *Cymbopogon*, which yield essential oils having different constituents. Laboratory has developed technology for growing a number of aromatic plants.

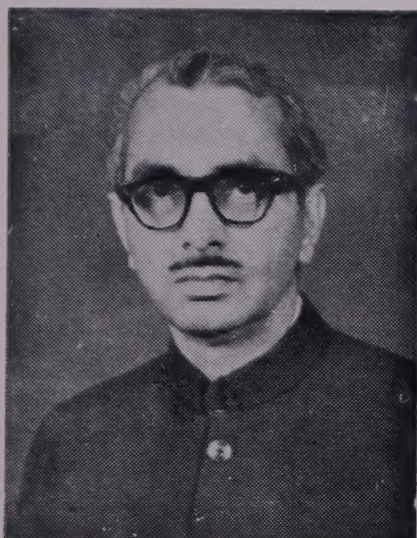
RRL, Jammu has devoted attention to the development of sophisticated steam distillation stills. A still with automatic loading and unloading facility has been set up in the Laboratory. Besides this a modified form of distillation still has also been designed and installed, the recovery of essential oil in which is 20-25% more than the conventional stills. While this is suitable for distillation of all aromatic plants, but is most suitable for *Clocimum* and *Jamrosa*, the two improved varieties developed by the Laboratory.

A pilot plant for the fractional distillation of essential oils has also been set up. It has fractional distillation columns having 5-200 litre capacity with modern automatic controls. Some of the columns having theoretical plates of the order of 50 are very efficient. Fractionation of turpentine oil was carried on these columns to generate design and process engineering data which led to transfer of technology to M/s Jammu Pine Synthetic Products, Jammu, who have set up the first Turpentine Fractionation Plant in J & K State with a capacity to fractionate 8 lakh litres of turpentine oil per annum to produce high purity α -pinene, β -pinene, Δ -³carene, longifolene and pine tar. The said firm has also taken know-how from the Laboratory for manufacture of terpineol, terpin hydrate and carene acetate.

Besides release of terpentine fractionation as a major technology, the Laboratory has interacted in a big way with rosin and turpentine industry. The Laboratory has provided engineering consultancy for an improved Resin Melting and Refining Unit to M/s Prabhat Terpenes and Synthetics, Jammu. Earlier know-how was provided to same company for manufacture of hydrogenated and disproportionated rosin. M/s Sud Pine Industries, Rishikesh are manufacturing estergums, maleic and alkyd resins with the technical know-how provided by the Laboratory.

The Branch Laboratory at Srinagar initiated in 1974 a research, development and extension programme for cultivation of hops and in 1981, 170 tonnes of hops worth Rs 120 lakhs were produced in the Kashmir Valley alone. New varieties of Aroma hops have been developed and are being grown on commercial scale. Technology for the extraction of essential oil from these hops has also been developed.

Besides growing of aromatic plants, their improvement, techno-economic survey of wild sources, extraction of their essential oil and fractionation into high value compounds, Laboratory is also engaged in the semi-synthetic conversion of low value compounds to high value compounds or conversion to useful compounds of byproducts of essential oil industry, which are going waste at present.



Dr Sukh Dev

Dr Sukh Dev, born June 17, 1923, at Chakwal in West Punjab, had a brilliant academic career. He stood first class first in B.Sc. (Hons) in Chemistry (1944) in the whole of Punjab, and obtained his M.Sc. degree from the Punjab University in 1945. Carried out research for Doctorate degree at the Indian Institute of Science, Bangalore and was awarded the Ph. D. degree in 1950 and D.Sc. in 1960.

Dr Sukh Dev held a number of positions in various capacities as Research Associate and Lecturer in Indian Institute of Science, Bangalore; National Institute of Sciences, Delhi; University of Illinois, Urbana, USA ; as Head, Division of Organic Chemistry (Natural Products), National Chemical Laboratory, Poona ; and is presently Director, Multi-Chem. Research Centre, Nandesari, Baroda.

Dr Sukh Dev has attended a number of international meetings and projects either as Chairman or invited speaker or visiting professor in almost all the leading nations of the world such as USA, USSR, Canada, Europe, Japan, Czechoslovakia, Australia, Bulgaria, Switzerland, Poland, Ceylon, etc.

He is a member of Indian Chemical Society ; American Chemical Society ; Elected Fellow of Indian National Science Academy ; Nominated Fellow of Intera-Science Research Foundation, USA (1971-76) ; and Indian Academy of Sciences (1974) ; and a coopted member of the Committee of the Organic Chemistry of International Union of Pure and Applied Chemistry (1975-79).

Dr Sukh Dev has been actively connected as Advisory Panel Member with various universities and research institutions like National Chemical Laboratory, Poona ; Indian Institute of Technology, Bombay ; M.S. University of Baroda; Bose Institute, Calcutta; National Botanic Gardens, Lucknow; ATIRA, Ahmedabad ; National Committee on Science and Technology, an apex Advisory Body to the Government of India (1977-80) ; and so on.

A flourishing school of Organic Chemistry has been established by Dr Sukh Dev. So far 65 students have been awarded the Doctorate degree by various Indian Universities for work carried under his direct supervision. Many of his students now occupy senior research positions in Universities,

Academic and R & D establishments, both in India and abroad.

He has so far, 202 publications and 24 patents to his credit in Synthetic Organic Chemistry, Nuclear Magnetic Resonance and Physical Organic Chemistry. Other publications include articles and reviews of general relevance as well as highly specialised scientific interest. Presently he is engaged in writing "A Compendium of Terpenoids" which will consist of eight volumes and will be published by CRC Press (USA).

Dr Sukh Dev has won a bunch of academic honours :

- a) Sudborough Medal for Best Researcher of the year, Indian Institute of Science, Bangalore (1949).
- b) Guha Research Medal, Indian Institute of Science, Bangalore (1958).
- c) Recipient of Shanti Swaroop Bhatnagar Memorial Award for Scientific Research, CSIR (1965).
- d) Recipient of Acharya P.C. Ray Memorial Medal, Indian Chemical Society (1970).
- e) Professor K. Venkataraman Lecturership Endowment lecturer for the year 1970-71.
- f) Dr Bawa Kartar Singh Memorial Lecturer (1975).
- g) Dr K. G. Naik, Gold Medal, Maharaja Sayajirao University of Baroda, for research work relevance to Chemical Industry (1977).
- h) Dr R. C. Shah Memorial Lecturer, Bombay University (1978).
- i) Vishwakarma Medal, Indian National Science Academy, for research work leading to the start of a new industry in India (1979).
- j) Ernest Guenther Award, American Chemical Society for contributions in the Chemistry of Essential Oils and related products (1980).

On behalf of Pafai, we sincerely congratulate Dr Sukh Dev for his outstanding and meritorious achievements and hope he would continue to bring honour and glory to our country.

ORGANISING COMMITTEE

President	—	Dr C. K. Atal
Secretary	—	Sh. B. M. Kapur
Members		
RRL, Jammu	—	Dr. P. R. Rao
		Prof. K. K. Kapoor
		Sh. S.K. Attreya
Pafai		Sh. Yashwant J. Gore
		Sh. P.K. Seth
		Sh. Rasik Lal Hemani
		Sh. S. B. Lal
Others	—	Sh. Y. R. Chadha
		Dr. B.C. Gulati

CONVENERS OF SUB-COMMITTEES

1) Printing		Sh. Y. R. Chadha
2) Transport and Accommodation	—	Sh. S. K. Attreya
3) Food	—	Prof. K. K. Kapoor
4) Registration and Public Relations	—	Sh. V. S. Prabhakar
5) Auditorium, Audio Visual and Recording	—	Dr Dinesh
6) Co-ordinator	—	Dr B.C. Gulati

PROGRAMME AND SESSION DETAILS

PROGRAMME

15.5.1982 (Saturday)	9.30 — 11.00 hrs — Registration of Delegates
	11.00 — 12.30 hrs — Inaugural Session
	12.30 — 14.00 hrs — Lunch
	14.00 — 15.30 hrs — Technical Session I
	15.30 — 16.00 hrs — Tea
	16.00 — 17.30 hrs — Technical Session I (Contd.)
	20.00 — 21.00 hrs — Dinner
16.5.1982 (Sunday)	9.00 — 11.00 hrs — Technical Session II
	11.00 — 11.30 hrs — Tea
	11.30 — 13.00 hrs — Technical Session III
	13.00 — 14.00 hrs — Lunch
	14.30 — 15.30 hrs — Technical Session III (Contd.)
	15.30 — 16.00 hrs — Tea
	16.00 — 17.30 hrs — Open Discussion and Concluding Session

INAUGURAL SESSION

Welcome

- (1) Dr C.K. Atal
Director
RRL, Jammu
- (2) Shri Y.J. Gore,
President, Pafai
- (3) Mr P.K. Seth, Regional
Secretary, North Zone,
Pafai

Inauguration

Chief Guest

Keynote Address

Dr Sukh Dev
Director,
Multi-Chem Research Centre

Vote of Thanks

Dr B.C. Gulati
Consultant, Essential Oils &
Medicinal Plants

SESSION DETAILS :

TECHNICAL SESSION I

Aromatic Plants and Their Extractives as Flavouring Agents

Chairman	Dr G.D. Kelkar
Co-Chairman	Dr B.C. Gulati
Recorder	Dr S.N. Sobti
	Shri Avinash Marathe

- (i) Production of Menthol
—B.K. Mehra

- (ii) Oleoresins
—A.G. Mathew

- (iii) Spice Oil and Oleoresin Industry—An Assessment
and Future Prospects
—E.S. Nambudiri *et al.*

- (iv) Essential Oils as Flavouring Agents with Particular
Reference to Peppermint Oils and Menthol
—S.B. Lal

- (v) Herbs for Culinary Purposes
—B.C. Gulati & Y.R. Chadha

- (vi) Saffron
—C.K. Atal, Scientist from Greece

- (vii) Attars as Flavouring Agents
—Sudhir Jain

- (viii) Flavours and Soft Drinks
—M.L. Shankaranarayana *et al.*

- (ix) Profile of Spice Flavour
—G.S. Ranade

TECHNICAL SESSION II

Semi-synthetics and synthetics as Flavouring Agents

Chairman	Dr Sukh Dev
Co-Chairman	Sh. J.C. Kathrani
Recorders	Dr R.K. Thappa
	Dr M.L. Shankaranarayana

- (i) Synthetic Methol
—R. Soman

- (ii) Chemistry and Technology of Vanillin
—J.S. Chawla, S.C. Puri & S. M. Anand
- (iii) Semi-synthetics and Synthetics (other than Menthol and Vanillin) as Flavouring Agents
—G.D. Kelkar
- (iv) Monosodium Glutamate and Other Flavouring Enhancers
—K.L. Dhar

TECHNICAL SESSION III

Analytical Techniques and Other Related Aspects of Flavouring Agents

Chairman	Dr I.D. Bajaj
Co-Chairman	Sh. S.B. Lal
Recorders	Dr K.L. Dhar
	Mr. Sudhir Jain

- (i) Organoleptic Techniques for the Evaluation of Food Flavours
—B. Raghuramaiah
- (ii) Flavouring Agents for Food—Regulatory Provisions and Analysis
—A.R. Sen & B.R. Roy
- (iii) Instrumental Techniques Used in Evaluation of Flavouring Compounds
—K.L. Dhar
- (iv) Food Adulteration Act as Related to Flavouring Agents
—J.C. Kathrani
- (v) Indian Standards on Flavouring Compounds
—M.S. Saxena

Technical Sessions



Dr. B. K. Mehra

ALPANA 60 PEDDER ROAD, BOMBAY 400 026

Born on 8th January 1920: M.Sc. (Tech.), Panjab University, Lahore; M.S. (Pharm.), Philadelphia; Ph. D. (Management), University of Delhi; F. A. F. Ph. E. A. M. P.

He is one of the few persons in the Pharmaceutical field in India who has education, training and management experience of the Sales and Manufacturing, besides top level general management.

He introduced, promoted and established Pfizer Products in India—particularly Terramycin, Deltacortril and later Protinex and Becosules. Did market survey and selected for introduction in India Merrell Products and established the sales of Bulk Drugs—Streptomycin, Penicillin and Menthol. Coordinator for the establishment of Pfizer Terramycin and Tetracycline fermentation plant at Chandigarh and planned Pfizer formulation and packaging plant at Thana-Belapur, Bombay. He was responsible for commissioning of menthol manufacturing plant at Bilaspur for Richardson Hindustan and formulation manufacturing of Ravison Pharmaceuticals, Bombay.

He has held top positions in Pfizer Pvt. Ltd., Richardson Hindustan Ltd. and Ravison Pharmaceuticals Pvt. Ltd.

Menthol and Mint Flavours

DR. B. K. MEHRA

ALPANA 60 PEDDER ROAD, BOMBAY 400 026

1. The introduction deals with definition of Flavours, brief history and its contribution in modern living.
2. Under the heading Mint Flavours, the broad spectrum use of Menthol and Mentha Oils is described. In India out of the Mint species, *Mentha arvensis*, *Mentha piperita* and *Mentha spicata* only are commercially grown. These flavours are used in peppermint candies, mint chocolates, mint liquors, medicated cough drops, pansupari, zarda, cough syrups and mentholated cigarettes for oral use. They are used in skin ointments, balms and rubs, haemorrhoidal ointments and snuffs for external use.
3. The growth of Mentha crop from scratch to a commercial crop is then detailed. For successful implementation of any medicinal plant or an aromatic plant, a commitment from the Industry in the commercial field, in dissemination of technical knowledge and in rendering prompt field help to farmers for growing, harvesting and saving the crop from pest attacks is essential. From Government side and the Research Organizations side, a commitment for long term research in continuously improving the quality and the contents of the crop, in developing newer strains and in the development of economical use of the byproducts is equally essential.
4. Various terms used for describing mentha oils and menthols are explained and clarified. Mentha oil, whole mint oil or raw mint oil is the distilled aromatic oil obtained by steam distillation of *Mentha arvensis* crop. Peppermint oil, U. S. P. & B. P. refers to aromatic oil obtained by the steam distillation of *Mentha piperita* crop. Peppermint oil (I. P.) should be correctly described as Mentha oil (I. P.) and is generally dementholized oil after some menthol has been crystallized out of the raw mint oil. Chemically there is no difference between natural and synthetic Menthol. Similarly there is no specific advantage or disadvantage in using Bold Crystals or Flakes.
5. Lastly there is the discussion on the safety of the use of Menthol and what more should be done to further support this usage. According to standard references Menthol is considered safe up to a concentration of 2% when taken orally and up to 10% in liniment or ointments. However, more data scientifically designed should be collected on the toxicology of Menthol. Further similarly scientifically designed clinical trials should be conducted for determining the safety limits of internal and external use of Menthol in human subjects. This would go a long way in settling the various views on the safety limit questions raised from time to time.



Dr A. G. Mathew

Dr A. G. Mathew received his education from Kerala University; M. Sc. Applied Chemistry in Oils, Fats and Aromatics and Ph. D. in Food Chemistry. Dr Mathew joined CFTRI, Mysore in January 1959, where he worked for 17 years on chemistry and technology of spices and plantation products. He joined the Regional Research Laboratory (CSIR), Trivandrum in May 1976. Under his leadership an effective research group in the area of spices and plantation products technology was formed. Since May 1981 he is acting as the Director of the Regional Research Laboratory, Trivandrum.

Dr Mathew is author of over 60 research papers many of which are published in internationally acclaimed journals. He is also member of a few commercially successful processes. He along with his group won the Indian Merchants Chamber Award for 1974 for development of process for the production of spice oils and oleoresins. He was one of the recipients of NRDC INDEPENDENCE DAY Award for 1979 for the process of dehydrated green pepper. ICAR honoured Dr Mathew and his colleagues with the prestigious Rafi Ahmed Kidwai Prize for the Bionnium 1974-75 for their contribution in chemistry and technology of spices.

Dr Mathew started his career with teaching of M. Sc. Applied Chemistry students of Kerala University during 1956 to 1959. He was the Co-ordinator of Food Chemistry for the FAO sponsored M. Sc. Course in Food Technology conducted by CFTRI and had guided students for their dissertations. He is also recognized for Ph. D. guidance by Universities of Kerala and Mysore.

Dr Mathew is a member of the Kerala State Committee on Science and Technology. He is an active member of Association of Food Scientists and Technologists, India, having served as its Hon. Exec. Secretary in 1973-74 and as President of Trivandrum Chapter in 1979-80. He is also involved in some important committees of ISI and is also a member of Post-Harvest Technology Panel of ICAR.

SPICES OLEORESINS

A. G. MATHEW

REGIONAL RESEARCH LABORATORY (CSIR)
TRIVANDRUM-695 019

India is one of the important producers of major spices in the world. Our current production of black pepper, ginger, turmeric and chilli are respectively 27,500, 73,000, 2,10,000 and 5,11,000 tonnes.

For flavouring purposes, the food processing industries in the West use more and more of oleoresins rather than raw spices. Oleoresins which are the concentrate of spices, are easier for blending and storage.

In oleoresins generally the non-volatile pungent constituents like piperine, capsaicin and gingerol and in some cases the colouring principles like curcumin are highly valued. The aroma, contributed by essential oil, is sometimes given a lower value. Because of this, the oleoresins are extracted by means of organic solvents. Subsequent steps include desolventisation. Removal of last traces of solvent is extremely important since the specifications stipulate that the solvent content should be only a few parts per million. Besides vacuum distillation, open steam and azeotropic distillation with a safe solvent like alcohol are necessary to bring the solvent level to the desired low limit.

While different solvents are used for specific spice, ethylene dichloride is the most commonly used solvent. Besides being a good solvent for the active principles, it is water immiscible and safe from fire hazards. Some studies with super critical gases have also been carried out.

For use in different products, oleoresins are often diluted, dispersed, decolourised and fractionated. The know-how for oleoresin manufacture is available in the country and at present India is a leading producer of oleoresins, especially of black pepper.

Shri E. S. Nambudiri

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE,
MYSORE

Shri E. S. Nambudiri was born on 1-7-1930 in Calicut. After obtaining Diploma in Food Technology from Kerala Polytechnic, Calicut, he joined CFTRI in 1957 and since then he has been actively engaged in the research and development of tea, arecanut, spices and cocoa. Based on his work, 5 NRDC processes have been released to industry. He is a co-recipient of Rafi Ahmed Kidwai Memorial Award, Indian Merchants Chamber Awards and also NRDC Award.

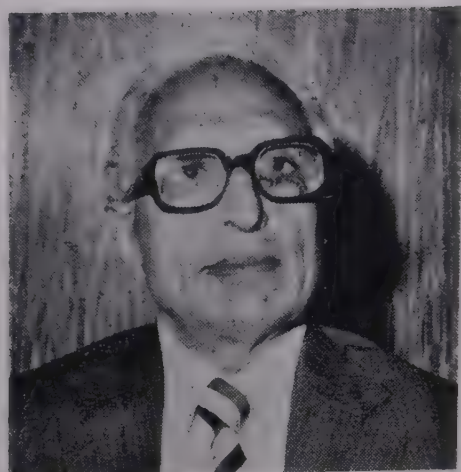
Shri Nambudiri has published 35 research papers in National and International Scientific Journals.

SPICE OIL AND OLEORESIN INDUSTRY—AN ASSESSMENT AND FUTURE PROSPECTS

E. S. Nambudiri, N. Krishnamurthy & M. L. Shankaranarayana

Central Food Technological Research Institute, Mysore

Spice oils and oleoresins possess to a large extent the full body flavour of the corresponding spices and find use in food flavourings, and to a limited extent in perfumery and pharmaceutical products. The oleoresin industry which was started in a small way with foreign collaboration grew into a large industry during the seventy's mainly due to the establishment of several units based on CFTRI and other indigenous technology. The production and export of spice products increased steadily reaching a saturation point. Recently, there has been an increasing trend in the World Trade of spice oils and oleoresins. We should take advantage of the present situation and stabilise this industry by increased production, cutting down the unit cost and maintaining/improving the quality of the product. The future growth and expansion of the spice industry depends on improvements in the processing techniques, development of newer technology and evolution of newer products and blends tailor-made for different end uses.



Shri S. B. LAL

Birth

1st June, 1921, Meerut (U.P.).

Education

M.Sc. (Physics).

University of Allahabad (1941).

Designation

Executive Director and Chief Perfumer
Gupta & Co. (P) Ltd., Delhi.

Professional appointments

- (i) President, Perfumes & Flavours Association of India, Bombay, 1979-81.
- (ii) Member, Perfumery Raw Materials Committee since 1954, Indian Standards Institution (I.S.I.), New Delhi.
- (iii) Member, Chemical Divisional Council, Indian Standards Institution, 1976-79.
- (iv) Member, Consumer Goods Divisional Council, 1976-79.
- (v) Vice-President, All India Manufacturers Organisation (A.I.M.O.) (D.S.B), 1977-79.
- (vi) Executive Member Incharge, Parliamentary Relations A.I.M.O., 1978-79.
- (vii) Executive Committee Member, Federation of Association of Small Industries, (F.A..S.A.I.), 1971-79.

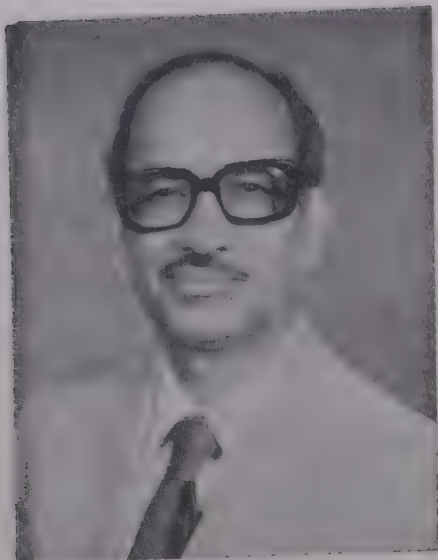
Essential Oils as Flavouring Agents with particular reference to Peppermint and Menthol

S. B. Lal

Gupta & Co. Pvt. Ltd.

Flavouring agents have been traditionally used since time immemorial to improve the quality and taste of food products. The paper describes the use of essential oils such as Ginger, Pepper, Cardamom, *Mentha piperita* and *Mentha arvensis* as flavouring agents with particular reference to *Mentha arvensis* and menthol. Their comparative use in various food products is described with special emphasis on food products more common in India. The toxicological implications of the use of various essential oils especially those used in food products are discussed and their relevance to the Indian scene is also discussed.

Shri Y. R. Chadha



Shri Y. R. Chadha, M. Sc. (Hons.) in Chemistry, is the Chief Editor of the Publications & Information Directorate (CSIR), New Delhi. He has been actively associated with the publication of the 11-volume encyclopaedia on Indian raw materials, namely, *The Wealth of India* which contains monographs on some 5,000 Indian economic plants, including aromatic and medicinal plants. This encyclopaedia has been acclaimed as one of the best reference work on economic botany, all over the world. He has initiated an information service on Medicinal & Aromatic Plants, which is now being computerized.

Shri Chadha has edited six books, authored two books including 'Diosgenin and Other Steroid Drug Precursors', and published over 40 papers in important foreign and Indian journals. He is a member of the publication advisory boards of a large number of organizations including Indian National Science Academy, and a member of the Documentation & Publication Sectional Committees of the Indian Standards Institution. He is the Founder President of the Society for Information Science.

Shri Chadha has widely travelled abroad. He studied at the Tropical Products Institute, London during 1961-62.

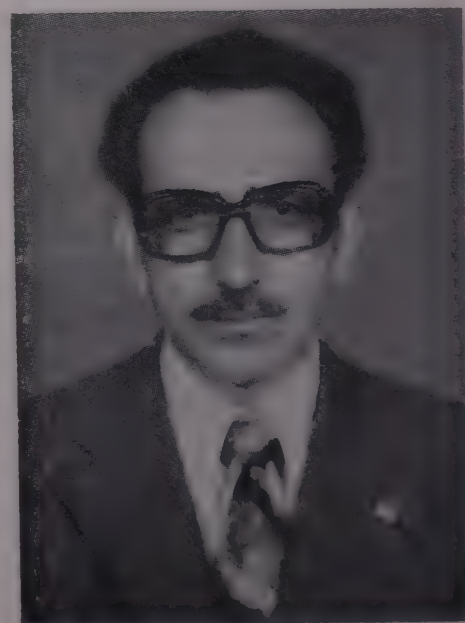
Dr B. C. Gulati

Dr B.C. Gulati, M. Sc. (Hons.), Ph. D., started his studies in the field of essential oil bearing crops in 1952 in the Forest Research Institute, Dehra Dun. From 1956-1960 he worked with Mr. P.C. Narielwala, Chairman, Essential Oils Research Committee (CSIR) and surveyed extensively the Indian essential oil industry. Dr Gulati joined CIMPO in 1960 as the first Officer Incharge of the Northern Zonal Centre, Haldwani. He was responsible for successful introduction & cultivation of 12 essential oil bearing and medicinal plants including the well-known Japanese mint, *Cicronella* and basil oils. He joined Drug Research Laboratory, Jammu as Scientist-in-Charge in 1974. Thereafter, he worked as Chief Executive of Meghalaya Phytochemicals Ltd.

He was on deputation to Bhavana Chemicals as Technical Adviser for developing large scale cultivation of Japanese mint and the production of its oil.

Dr Gulati is author of about 130 research publications. He has been abroad for specialised work in the field of aromatic and medicinal plants. He was actively associated with the work of Essential Oils Association of India and its journal 'Indian Perfumer', and the work of the Indian Standards Institution, New, Delhi.

At present he is working as Consulant on Aromatic and Medicinal Plants cultivation and production of products therefrom.



HERBS USED FOR FLAVOURING CULINARY PREPARATIONS

B.C. Gulati & Y.R. Chadha

Use of herbs for flavouring food preparations has been widely prevalent since times immemorial, not only in the East but also in the West. Although essential oils and extracts obtained from these herbs have now come in vogue, the use of herbs as such is still widespread. Perhaps well over 100 species are collected in India and elsewhere for flavouring purposes and many of these are also accredited with medicinal properties.

The paper describes the more important species, mostly cultivated and which are consumed in considerable quantities in India. These include coriander (*Coriandrum sativum*), saunf (*Foeniculum vulgare*), anise (*Pimpinella anisum*), garlic and onion (*Allium* spp.), celery (*Apium graveolens*), capsicum (*Capsicum* spp.), caraway (*Carum carvi*), cinnamon and tejpat (*Cinnamomum* spp.), saffron (*Crocus sativus*), cumin (*Cuminum cyminum*), turmeric (*Curcuma longa*), cardamum (*Elletaria cardamomum*), sweet marjoram (*Majorana hortensis*), mint (*Mentha* spp.), curry leaf (*Murraya koenigii*), black pepper (*Piper nigrum*), clove (*Syzygium aromaticum*), fenugreek (*Trigonella foenum-graecum*), ajowan (*Trachyspermum ammi*), ginger (*Zingiber officinalis*), nutmeg and mace (*Myristica fragrans*), dill (*Anethum* spp.), and asafoetida (*Ferula asafoetida*).

Vanilla beans and hops are also used on a large scale for flavouring items of internal consumption, though not in culinary preparations. In addition, some wild herbs, e.g. *Allium* spp., *murraya* spp. which enjoy local popularity for flavouring food preparations, have been discussed.

Dr C. K. ATAL

Regional Research Laboratory, Jammu



Dr C. K. Atal, Director, Regional Research Laboratory, Jammu, born on November 4, 1928 has a distinguished academic record. He has a basic degree in pharmacy but subsequently obtained specialised training in the botanical sciences at the masters degree level and chemical sciences specialising in natural product chemistry at Ph. D. level.

Dr Atal holds a doctorate degree in plant chemistry from the University of Connecticut and after that he obtained his Ph. D. degree, he was engaged at the Faculty of Creighton University, U.S.A. as Acting Chairman of the Department of Biological Sciences at the Medical Centre. He returned to India in 1958 and was Head of the Department of Pharmacognosy and Phyto-chemistry at Panjab University, Chandigarh upto 1964. During this period he held a CSIR scheme on the selection of high yielding strains of *Eucalyptus citriodora*. He also carried out studies on the detection of adulteration in drugs which are valued for their essential oils and the flavour qualities.

Dr Atal later on joined Regional Research Laboratory, Jammu in 1964 and for a number of years he successively headed the Division of Pharmacognosy and Phyto-chemistry, Division of Economic and Applied Botany including the charge of Chatha Farm where cultivation of medicinal and aromatic plants was organised. He took over the charge of Regional Research Laboratory, Jammu as Director in 1974.

Dr Atal has a rare combination of knowledge of two sciences, i.e. chemistry and botany, in both of which he has made substantial contributions as evidenced by about 350 research publications in Indian and foreign Journals in the field of chemistry of natural products, essential oil bearing plants, fixed oils from plant sources, survey and screening of raw materials, introduction and experimental cultivation of plants, tissue culture studies, synthetic chemistry and pharmacological investigations of plant principles. He has to his credit 10 process patents. He is editor of the well known reference book entitled "Cultivation & Utilisation of Medicinal and Aromatic Plants", which has since been updated, revised and enlarged and published in two companion volumes : Cultivation & Utilization of Medicinal Plants; Cultivation & Utilization of Aromatic Plants.

Dr Atal has guided 14 doctoral students. He has published five books and six reviews. He has held membership of important Government Committees, some of which include; Tea Development Evaluation Committee of Govt. of India; Indian Pharmacopoeia Sub-committee on medicinal plants; Unani Pharmacopoeia Committee and sub-committee of drugs of doubtful origin; panel of experts for pharmaceutical education under the Ministry of Health; Reviewing

Committee for assisting the work of medicinal plants survey unit of Ministry of Health located at Ranikhet; Reviewing Committee on the work done at the Indian Medicinal Research Association, Poona; working group on development of hill areas, set up by Govt. of India; Governing Body, Ayurvedic Research Council; Advisory Board, Indian Journal of Pharmacy, Bombay; Indian Journal of Pharmaceutical Sciences; Medicinal and Aromatic Plants Abstracts and Indian Perfumer. He is a life member of American Society of Economic Botany & member Current Science Association.

Dr Atal was unanimously elected as President of the Essential Oil Association of India in April, 1976, and re-elected for a period of two years by the said Association of India in their convention held in Hyderabad during March, 1976. He got J. N. Tata Endowment Scholarship for higher studies, was invited to deliver special lecture at Indian Chemical Society Convention, Ahmedabad and was Sectional Chairman at several Scientific Annual Conventions. He visited Poland in November, 1972 on the invitation of the Polish Academy of Sciences Organic Chemistry Institute to deliver a series of lectures connected with his contribution on the chemistry of natural products. He also visited U.S.A. for two months in 1974 under invitation from National Science Foundation. He attended conference of development of Caribbean area as an Expert on behalf of Common Wealth Research Council. In 1981, he visited Bulgaria and attended the International Conference on Chemistry and Biotechnology of Biologically active Natural Products and chaired one of the sessions. He also visited Greece and delivered a special lecture at the International Symposium on Aromatic Plants. For about 4 weeks he was assigned as a W.H.O. Expert Consultant to the Division of Toxicology, Bureau of Foods (FDA) of USA to investigate the cases of human poisoning due to contamination of food with pyrrolizidine alkaloid containing seeds.

Eversince he took charge of Regional Research Laboratory, Jammu, he has emphasised on the role of scientists to help create new technology which should have relevance to the needs of the industry in the country. Under his leadership, RRL, Jammu has gained the distinction of becoming a premier R & D Institute on aromatic plants, essential oils, their fractionation, semi-synthetic conversions & their development into perfumery and flavour compounds.

SAFFRON

Dr C. K. Atal

Saffron is a very delicate and important food flavour with a colour of its own. It grows under restricted agro-climatic conditions. In the present paper, cultural practices, area under cultivation, trade pattern and its utilization is being presented. Essential aspects of chemistry will be covered in brief.

Sudhir Jain

- Birth** : 22nd January, 1949, Bombay.
- Education** : B. Sc. (Hons.) Chemistry
University of Delhi (1969).
- Professional** : Trained extensively in Perfumery in India
and Europe.
- Designation** : Executive Director &
Director of Research & Developments,
Gupta Perfumers (P) Ltd., Delhi.
- Professional** (i) Executive Committee Member
- appointments** : Essential Oil Association of India.
- (ii) Member
Perfumery Raw Materials
Committee, Indian Standards Institution (I.S.I.) P. C. D. C. 18.
- (iii) Convener
Technical & Programmes Committee,
Vth PAFAI Seminar, New Delhi.



Attars As Flavouring Agents

Sudhir Jain

Attars have been traditionally used in India for cosmetic as well as flavouring purposes. Attars of Rose, Kewra, Hina, Gul Hina, Jasmine, Motia, etc. are the more common Attars which are made and used by the flavouring industry. The main consumer of Attars is the Zarda or Chewing Tobacco Industry. The paper discusses the manufacture and use of Attars in the Zarda Industry and the advantages that are thus derived. The potential in the improvement and growth of the industry is discussed.

Dr M. L. Shankaranarayana

Dr M. L. Shankaranarayana was born on 2-3-1935, educated at Mysore (B.Sc.), Sagar (M.Sc.) and the Indian Institute of Science, Bangalore (Ph.D.). He was on the Science teaching faculty at Regional College of Education, Mysore, during 1965-1967. He joined CFTRI, Mysore in 1967 and since then he has been working as Scientist in the Discipline of Plantation Products & Flavour Technology. He has been actively engaged in area of food flavours, sulphur compounds, analytical chemistry, etc. He has published 50 research papers.

Flavour For Soft Drinks

**M.L. Shankaranarayana, K.O. Abraham, B. Raghavan &
N.B. Shankaracharya**

The commercially important soft drinks are Cola type, Orange, Lime, Lemon and Ginger flavoured beverages. Each of these possesses a characteristic flavour, colour, taste and appearance. Flavour is perhaps the most important property characterising the drink. The flavour blends are made up of flavouring ingredients (essential oils, oleoresins, aromatic substances), colourings, acidulants, and other additives like preservatives, antioxidants, clouding agents, emulsifiers, etc. The composition of the flavour blends is a guarded secret of the manufacturers. The essential oils like Orange, Lime, Lemon, etc. are purified by deterpenation techniques for improved flavour quality and shelf life. The quality examination of the raw materials, flavour blend and the final beverage is carried out by using instrumental and sensory methods.

G. S. Ranade

Shri G. S. Ranade, 41, passed M. Sc. in Organic Chemistry with Natural Products as special subject in 1st class with 1st rank, from Poona University in 1964. He has fifteen years experience as a practicing perfumer and flavourist in Hindustan Lever, where he received professional training in the U. K. He also has experience of setting perfumery laboratory outside India.

Currently he is with M/s Richardson Hindustan Limited, as a Manager in Chemical specialities.



Profile of Spice Flavour

G.S. Ranade

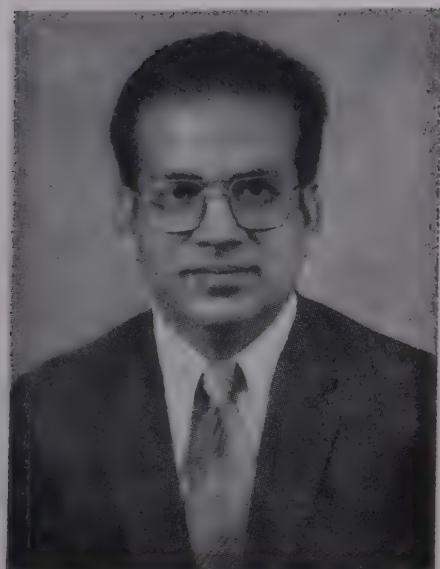
*Richardson Hindustan Ltd.,
Bombay 400 011*

The prime purpose of spice and spice derivatives is to enhance the appeal for food by imparting flavour. India has been considered as “the home of spices” and the quality of spices produced and exported from India is one of the best.

The basic material from which the spice flavours originate is the dried spice itself.

The flavour principles in the spice are of volatile and non-volatile nature. The extraction of spice to give “complete flavour” representing the original dried spice constitute very sophisticated spice technology involving expertise of organic chemist and flavourist.

The paper presents the profile of spice flavour comprising flavour principles, their extraction and organoleptic analysis of spice extract taking “Black Pepper” as illustration.



Dr R. Soman

Dr R. Soman, 44, is a Senior Group Leader at Multi-Chem Research Centre, Baroda (R & D Division of Camphor & Allied Products Ltd., Bareilly, U.P.). CAP's prestigious Rs. 2.80 crores synthetic (—)-menthol plant at Bareilly is based on the process invented and developed by Dr Soman's research Group. Prior to joining MRC in 1973, he had worked as a Pool Officer at the National Chemical Laboratory, Poona for about an year and as a Postdoctoral Research Associate at the University of Georgia, USA, for over four years. His research interests are in the field of flavour and fragrance chemicals, insecticides and insect control chemicals, stereochemistry and reaction mechanisms. He has over twenty papers and patents in these fields.

Synthetic (—)-Menthol

R. Soman

Multi-Chem Research Centre, Baroda

The bulk of (—)-menthol available in the world market up to 1970 was obtained from *Mentha arvensis* oil. Synthetic (—)-menthol derived from petroleum feed-stock and from certain monoterpene hydrocarbons started making an impact in the market by mid-70's and today it constitutes more than 50% of the world consumption of (—)-menthol.

This paper describes the different commercial methods of manufacture of (—)-menthol with emphasis on MRC process based on (+)-3-carene as the feed-stock. It will also discuss the present status of menthol industry (India and world), future prospects of natural (—)-menthol vs synthetic (—)-menthol, and aspects of chemistry and flavour of some menthol derivatives.

Dr J. S. Chawla

Regional Research Laboratory, Jammu-Tawi

Dr J. S. Chawla (Born, April 13, 1936), Scientist E, Regional Research Laboratory, Jammu obtained M. Sc. (Tech) in 1956 and Ph. D. in 1963 from the Panjab University, Chandigarh. He worked as a Lecturer at the Panjab University College, Hoshiarpur for a period of about one year and then joined the Forest Research Institute, Dehra Dun as a Research Scholar and worked in the Composite Wood Branch and Cellulose & Paper Branch on the Utilisation of Arecanut Husk and other Lignocellulosic materials. Later he worked as a Pool Officer at the Chemical Engineering and Technology Dept. Panjab University, Chandigarh. In 1964, he joined the Regional Research Laboratory (CSIR), Jammu-Tawi, as a Scientist B and organised the Cellulose Pulp & Board Section which he is heading ever since.

Dr Chawla's work is mainly connected with the chemistry and utilisation of lignocellulosic materials for the production of useful products. He has studied large number of materials for paper pulp, fibre boards, particle boards, wood plastics, lignin based fine chemicals as well as cellulose derivatives.

One of his significant achievements has been the utilisation of fine needles, a renewable forest waste, for the production of fibreboard for use as a packing material for the transportation of fruits and other articles. He is also responsible to demonstrate the possibility of making vanillin and other fine chemicals (based on lignin) from certain species of saw dust.

He worked on the Thermo Mechanical Pulping, the latest High Yielding pulping technique, at the Swedish Forest Products Laboratory and AB Defibrator, Stockholm (Sweden).

Dr Chawla has visited number of R & D Institutions and industrial units connected with paper pulp, fibre board and other wood based products in U.K., U.S.A., Sweden, Norway, W. Germany, Denmark and Italy.

He has more than 70 papers to his credit and provided consultancy to number of parties.

Dr Chawla was awarded merit increments under the CSIR merit promotion scheme and was declared RRL Scientist of the year 1976 by the Regional Research Laboratory, Jammu for the meritorious work done by him.



Chemistry and Technology of Vanillin

J. S. Chawla, S. C. Puri & S. M. Anand

Regional Research Laboratory, Jammu-Tawi

Vanillin is an important flavouring substance used in confectionery, pharmaceuticals and perfumery. It is creamish white powder or needle shaped crystalline material with characteristic vanilla odour. It occurs in vanilla pods and gum benzoin. Extraction of vanillin from vanilla pod is costly and the growth of the plant is limited to few countries. It is synthesised from isomerised eugenol under mild oxidation reaction. It is also made from guaiacol and safrol by various standard reactions. The sources of eugenol such as clove oil and cinnamon oil are not enough as well as unreliable and costly. Bulk of the vanillin is, therefore, manufactured from lignin available as ligno-sulphonates, which are byproducts of sulphite pulp mills, formed during the sulphite chemical pulping of wood. The lignin in the wood, is sulphonated and gets dissolved releasing the cellulose for paper making. For technical and economic reasons the ligno-sulphonate of coniferous wood species is oxidised to get vanillin.

Lignin is a highly polymerised three dimensional net work mainly built up of phenyl propane units linked in a statistically random fashion having C—C as well as ether bonds. It is present to the extent of 25-30% in wood. The lignin macromolecules in coniferous species are mainly built up of guaiacol propanoid precursors while lignin in the deciduous woods contain both guaiacyl propane and syringyl propane precursors. Indian paper mills are using mainly bamboo and deciduous woods adopting alkaline sulphate method of pulping and burning the lignin containing liquors for recovering the inorganic chemicals. The industrial demand of vanillin in the country is met with from imports. The paper also reports the results of studies carried out on the preparation of vanillin using saw dust of coniferous species as a source for lignin. The yield of vanillin from saw dust varied between 5-6% on lignin basis. Investigations on the vanillin and syringaldehyde ratios from different sources of lignin and the possibility of recovering other fine chemicals are reported in the paper.



Shri G. D. Kelkar

Passed his B. Sc. from St. Xavier College, Bombay in 1952 and immediately joined his family business of Perfume Manufacturing. He is at present Managing Director of S. H. Kelkar & Co. Ltd.

Mr. Kelkar was invited by United Nations Industrial Development Organisation to visit seven Asian Countries in nine weeks and report on Essential Oil Plantations possibilities in these countries. The report was highly appreciated by all experts. He read papers in many National and International Seminars on various aspects of Perfumery Industry. He is the Vice President of The Basic Chemicals Soaps Cosmetics Export Production Council. He was the President of Perfumes and Flavours Association of India 1976-1977. He is the Ex-President of Rotary Club of Mulund, Founder of Bombay Rose Society. He has chaired many Government and Semi-Government Organisations. He has helped many Educational Institutions.

Semi-Synthetic and Synthetics (other than Menthol and Vaniline) as Flavouring Agents

G.D. Kelkar

S. H. Kelkar & Co. Ltd., Bombay

Originally all the flavours used were from natural resources. In a number of cases flavours are developed by enzymatic action or fermentation or partial decomposition by heating, e.g. butter, almonds, alcoholic beverages, roasted almond/chicken. With the increasing demand, natural sources were found inadequate and hence a need for synthetics which many a times are the constituents of natural flavours and are now widely used. Important among these are vaniline, menthol, geraniol, Phenyl ethyl alcohol and various esters. Flavours produced by partial decomposition are being made synthetically by Maillard Reaction ; such products could be served as semi-synthetics. By this method we can get flavours like chocolate, meat, chicken, beef, etc. without using the respective materials.

Dr K. L. Dhar

Designation : Scientist E 1
Regional Research Laboratory
Jammu

Date of Birth : 2.4.1936

Educational qualification : M.Sc. (Agra University), 1959
Ph.D. (Agra University), 1963

Research publications : 120 papers

Patents Two

Monographs : Two

Processes developed : Seven

Field of specialisation : Chemistry of Natural Products, with special reference to the isolation and characterisation of alkaloids, isoflavones, flavones, coumarins, lignans, terpenoids, steroidal lactones and glycosides, including the syntheses. Actively engaged in the molecular modifications of compounds showing pharmacological activity and perfumery value.



Mono Sodium Glutamate (MSG) and Other Flavour Enhancers

K. L. Dhar

Regional Research Laboratory, Jammu

Mono Sodium Glutamate (MSG)

1. Glutamic acid (amino glutaric acid) is a non-essential amino acid of food proteins. Mono sodium glutamate (MSG) is a white crystalline substance derived from the proteins of plants. It is extracted from soya bean, maize, wheat and sugar beet by acidic or alkaline hydrolysis.
2. The superior flavour of young freshly harvested vegetables may partly be due to their higher glutamic acid content as compared to the more matured, stored vegetables. The unusually high glutamic acid content of mushrooms may explain their characteristic flavour and their enhancement of flavour of other foods. Soya sauce and soya curd have high content of glutamic acid and are used to enhance flavour of other foods.
3. MSG enhances and intensifies the flavour of many foods (it is a flavour potentiator) and in some cases reduces the objectionable tang that develops during the processing of certain vegetables. It is frequently added to canned meat, vegetable soup, poultry and fish. MSG in the powder form can be directly added to dry spicy mixtures and meat tenderizers. Sometimes the quantity of seasonings desirable in sausage and cooked meats is reduced when MSG is included in the recipe. MSG draws out hidden flavours and tends to enhance "weak" flavours and often subdues the less desirable flavours by raising the background flavour level. There is practically no aroma associated with MSG although alone it has a salty taste.

A unique property of MSG is its ability to increase salivation. The more the saliva present in the mouth, the better chance there is for appreciating delicate aroma components when eating food.

MSG does not have any effect on fruits, fruit juices and sweet spicy foods.

Excessive amounts of MSG are avoided because they give the food an unpleasant taste.

MSG lessens the saltiness in some foods but increases it in others. It reduces the sour taste of tomato products and represses certain undesirable flavours.

MSG added to soups and broths may give the feeling of more body and satisfaction after eating.

There is still no widely accepted physiological explanation for why it works in this manner.

4. World production of MSG is more than 100,000 tonnes/year. The industrial methods of production will be discussed. It is often prepared from wheat gluten (which contains 36% of glutamic acid on a protein basis), casein, soya bean or sugar beet and by fermentation.

Ribonucleosides 5'-phosphates

They are a new class of flavour potentiators and are being used currently in the food industry. They occur naturally in muscle, dry sardines, RNA, yeast extract and are prepared by fermentation.

They also give the illusion of a certain viscosity in soups creating an impression of body and rich flavour.

The 3 most commonly used ribonucleoside 5'-phosphates are :

- (i) Disodium Inosinate
- (ii) Disodium Guanylate
- (ii) Disodium Xanthylate

They are used alone or in combination with MSG.

Maltol

Maltol imparts the "freshly baked" odour and flavour to bread, cakes and other bakery products.



Shri B. Raghuramaiah

Shri B. Raghuramaiah is working for Robin Chemicals Private Limited, Madras, as the Production Manager. His work relates to creation, production and application of flavours to foods, apart from his specialization in the manufacture of aerated waters, canned foods, confectionery and in food and packaging developments.

Shri Raghuramaiah graduated in Agriculture in First Class from Andhra Pradesh Agricultural University in the year 1966. He obtained Post-graduate Degree in Food Technology in First Class with Distinction from the FAO International Food Technology Training Centre at the Central Food Technological Research Institute, Mysore, in the year 1969. He shared the "K.U. PATEL AWARD" for the publication "Citrus Beverages—Manufacture and Quality Control". Shri Raghuramaiah has worked as Production Manager at Banana Powder Factory, Jalgaon and as Research Assistant at the Metal Box Company of India Limited, Calcutta, and subsequently at CFTRI, Hyderabad. He later joined Warner Hindustan Limited, Hyderabad, as Development Officer (Foods).

Shri Raghuramaiah is a professional member of the Institute of Food Technologists, U.S.A., Member of the Association of Food Scientists and Technologists (India) and a member of the Nutrition Society of India. He is the Honorary General Secretary of the Association of Food Scientists and Technologists, Southern Regional Branch for the last two years. He is a member of Lions Club, Madras.

Organoleptic Techniques for Evaluation of Food Flavours

B. Raghuramaiah

Robin Chemicals Private Limited, Madras

Flavour which is a combination of taste, smell and feel, is an important characteristic for acceptability of foods. Flavours are added to foods which are deficient in natural flavour to supplement, roundout, enhance or complement the flavour of basic ingredients and to replace the processing losses.

Humans are the excellent measuring instruments of organoleptic quality but since the sense of taste and smell varies considerably between individuals, it is essential to have flavour specialists, trained panel members and semi-trained panel members for evaluating the flavours and flavour applications in processed foods.

In most of the routine cases the flavourist himself will evaluate the flavours. The response of the flavourist may be biased sometimes and hence it is necessary to evaluate the newly developed flavours and their applications in foods by trained and semi-trained panelists, especially where preferences are to be evaluated in market area as in case of new flavour applications in beverages.

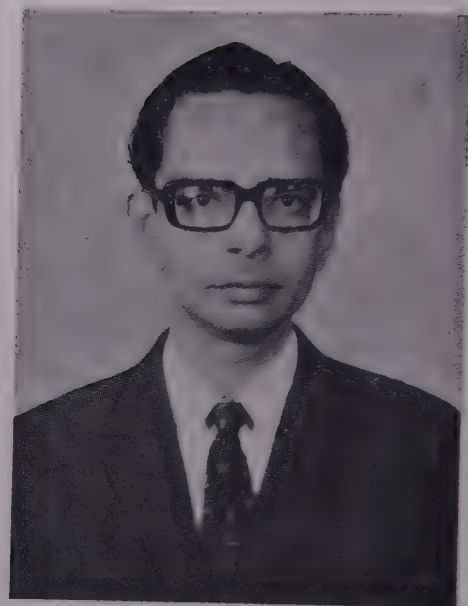
It is essential that the sensory evaluation be conducted in quiet and well lighted rooms free from any odour and at comfortable temperatures. Out of the different sensory methods, the commonly used ones for evaluating flavours and processed foods wherein flavours are used are: paired comparison test, triangle test, ranking test, flavour profile analysis and sensitivity tests—threshold tests and dilution tests.

The paper describes these sensory techniques and emphasizes the importance of selection of proper reference standards since these are the models accepted for measuring the flavour quality.

A.R. Sen

Born in 1933. Started his career as one of the Public Analysts in Calcutta Corporation in 1954. In 1956, joined the West Bengal Public Health Laboratory, Govt. of West Bengal. Joined the Central Food Laboratory in 1967, now working as Technical Officer.

Published about forty papers in the accredited scientific journals in India and abroad. As a past time, published numerous popular science articles in leading local magazines (Bengali), and editing Chemistry section of a local encyclopaedia (Bengali).



Flavouring Agents for Food-Regulatory Provisions and Analysis

Shri A.R. Sen & B.R. Roy,

Central Food Laboratory, Calcutta

Flavour of food constitutes a twin sensation of taste and olfaction. When natural, nature identical or synthetic flavours are added to foods, these are deemed to be food additives for all practical purposes. Technological necessity of their use in food has been generally recognised. Understandably these are subjected to relevant considerations for safety, maximum permitted concentration, detection and analysis, and surveillance with a view to regulatory activities. Guiding provisions of Indian Food Rules relating to use of flavouring substances, carrier solvents and flavour potentiators in foods have been discussed. Mention has also been made of the work done at the Central Food Laboratory, Calcutta, with special reference to some items of analytical methodology devised for those substances.



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Instrumental Techniques Used in Evaluation of Flavouring Compounds

K.L. Dhar

Regional Research Laboratory, Jammu

The problem of the assessment of an aroma or flavouring substances is a long standing one. To cope with this problem analysts in the field are using both the physico-chemical techniques and the sensory testing for maintaining the quality of an aroma chemical. Both these procedures are complementary and need to be used alongside with each other. On their own none of the procedures alone can achieve perfect quality control. Under the physico-chemical techniques used for analysis come all the instrumentation techniques and the physico-chemical characteristics. Physical characteristics of an aromatic substance which include measurements of the density, specific rotation, refractive index are quite important and give information about the purity of the product. The chemical analysis includes the determination of the values of functional groups like ester value, alcohol value, carbonyl value and phenol value which is an estimation of these groups present in an aroma chemical.

Among the instrumentation techniques the absorption spectroscopy in the UV, visible and the infra red range of the electromagnetic end of the spectrum is quite informative. As the absorption in the UV and visible range tells us about the distribution of the π electrons in a system which IR spectrum shows the presence. IR spectrum shows the presence of the functional groups present which can also tell us about the impurities present in a flavouring substance by comparing the spectrum of the two substances. Another spectroscopic technique which involves molecules containing atomic nuclei, with a magnetic moment, absorb in the radio frequency range. We call this as ^1H NMR for proton resonance and ^{13}C NMR for ^{13}C resonance. The principal role of NMR spectroscopy is the elucidation of molecular structure. But now-a-days ^{13}C NMR is being used for the analysis of an essential oil. This technique is very useful in the detection of adulteration in the substance being tested and the identification of the components, of an oil. Another molecular technique is the mass spectroscopy which also gives information about the structure of a molecule. Chromatography which is known since long is one of the most important techniques for analysis using a mobile phase and a stationary phase. If the mobile phase is a gas and the stationary one a liquid, we call it GLC. GLC is very useful as it gives information regarding the composition of a volatile substance and also the percentages of the components. GLC coupled with MS can provide a valuable information regarding the structures of the components of an aroma chemical. Other chromatographic techniques used for the analysis are HPLC and TLC where HPLC provides a costly instrument for analysis while TLC is the cheapest and quickest method for the analytical control of a flavouring material. TLC coupled to GC can still lead to much information not given by GC alone.

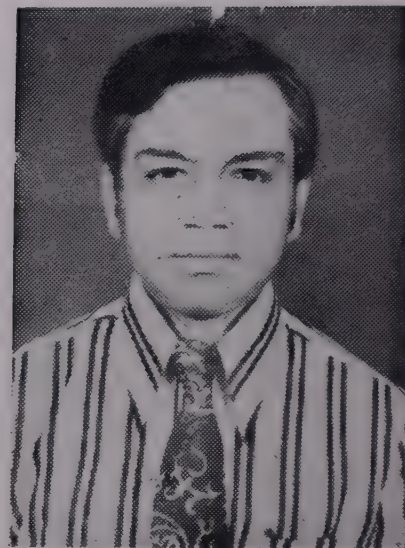
The thermal energy analysis TEA deserves a mention in the context of investigation of carcinogenic N-nitrosoamines. Thermal dissociation of the N-NO bond yields NQ which has a long life. This on oxidation to the excited NO_2 species emits radiation which on amplification will record the presence of N-nitroso compounds. If it is necessary to separate the N-nitroso compounds before analysis TEA can be coupled to a GC or HPLC apparatus. Finally, we have the sensory testing where the signals from the olfactory neurons are transmitted to brain. Thus the pattern of response from a large population of olfactory receptors determines odour quality and is the basis of odour discrimination.

J. C. Kathrani

Shri J.C. Kathrani is a partner in M/s Asian Chemical Works, Bombay.

After graduation in science, he did his B.S. in chemical engineering from the U.S.A.

Shri Kathrani is the President of the All India Saccharin Manufacturers' Association; member of the Food Additives Sectional Committee, AFDC 19, of the Indian Standards Institution; and Secretary of the Food Colour Manufacturers' Association of India.



Prevention of Food Adulteration Act As Related to Food Flavours

J. C. Kathrani

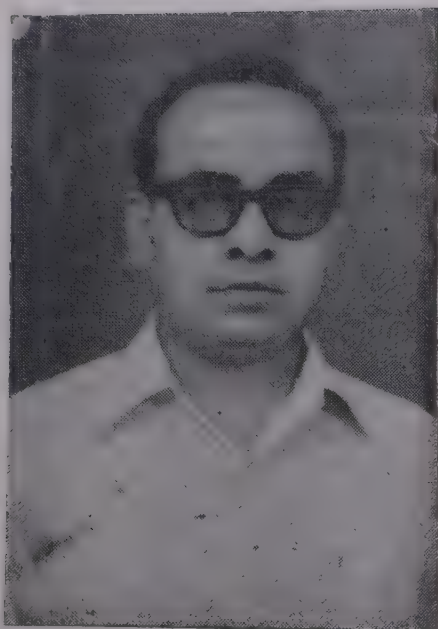
A review of the Prevention of Food Adulteration Act, 1954, indicates that an important factor like water was excluded, even though to acquire clean water is a major problem in the country.

At present the trend is that nobody dares to start Food Industry on account of the stringent punishment meted out to the defaulters even on technical mistake. Strictly speaking, the law relating to food should protect the industry as well as the consumers. The minimum six months imprisonment imposed even for a minor lapse should be waived. The punishment should be according to the merit of the case only.

The draft notification No. GSR 156 dated 30th January, 1982, published in Gazette of India dated February 13, 1982, will be discussed in detail. It is observed that many items will come under ISI mark as per the above notification. This also must be reviewed before implementing the same.

It is observed that Appendix B to Rules do not cover many of the items. As a result the flavours and colours cannot be used in those items. Such a discrimination is not in order.

As it is a practice in the United States to provide a list of the items which are generally regarded as safe and is under periodical review, it is also quite necessary that in India also we have our own GRAS list which should be reviewed from time to time. But the only difficulty in our country is that any amendments to the rules take a long period.



Shri M. S. Saxena

Shri Saxena is presently Director, Petroleum, Coal and Related Products Deptt. of the Indian Standards Institution, New Delhi. He has a brilliant academic record and was the recipient of Macmahon Gold Medal for securing First Class First in M. Sc. (Chemistry) of Lucknow University in 1953.

After 5 years of research-cum-teaching of graduate courses initially at DSB Govt. College, Nainital and Lucknow University, he joined the first batch of officers selected for ISI service cadre. During the initial two years of his service, he visited and studied quality control and standardization in more than 100 industrial units in the country and visited almost all the CSIR laboratories and other testing establishments throughout the country.

Shri Saxena has been associated as Secretary of the Technical Committees responsible for formulating over 200 national standards in diverse fields as natural and synthetic perfumery materials, cosmetics, paints, brushware, leather & footwear, treated fabrics, alcohol and allied products, coal carbonization products, etc.

Since July 1969, as the Director of ISI's Kanpur Branch, he has been actively engaged in implementing national standards including feedback to technical committees at the headquarters, which involved technical service to industry including supervision and inspection of licenses under ISI Certification Marking Scheme for a variety of industrial products. He visited Japan for three weeks in 1977 to join the international training seminar on standardization and quality control.

In the year 1980, he represented India at the International meeting of ISO/TC 45 Rubber and Rubber Products at Dubrovnik, Yugoslavia. He is also the Secretary of ISO/TC 45/WG 4 Physical Properties, Secretariate being with India.

Importance of Standardization in the Field of Flavours and Flavouring Materials

M.S. Saxena

Director (Petroleum, Coal and Related Products)

Indian Standards Institution, Manak Bhavan, New Delhi-110002

Indian Standards Institution (ISI) through Natural and Synthetic Perfumery Materials Sectional Committee (PCDC 18) under the Petroleum, Coal and Related Products Department has been engaged in the preparation of National Standards, methods of sampling and tests and olfactory assessment of natural and synthetic perfumery materials (NSPM). Nearly 20 standards on natural essential oils, 35 on synthetic perfumery materials, a comprehensive standards on method of sampling and tests and a separate standard on method for olfactory assessment of NSPM have been prepared. Attempts evolving a method for organoleptic assessment of NSPM is on the programme of work since quite a few of the essential oils as well as synthetic perfumery materials are also used in food and flavour industry. Separately, under the Agricultural and Food Products Deptt (AFD) work on sensory evaluation is being dealt with, under the Species and Condiments, AFDC 21 and Sensory Evaluation, AFDC 38 committees. At the international level, under ISO a Sub-committee under ISO/TC 34 Agricultural and Food Products Committee deals with sensory analysis of food products. Realising the limitations of authentic information and experience on the requirements of fragrance materials for food and flavour use under the Indian climate, environment, physiological considerations, diverse patterns of food preferences and ethnic considerations, recourse to collect detailed information from various international sources like International Fragrance Association (IFRA), International Organization of the Flavour Industry (IOFI) and Research Institute for Fragrance Materials (RIFM), it is possible to prepare technological lists; positive/negative lists; or generally recognised as safe (GRAS)/generally not recognised as safe (GNRAS) lists on the basis of this information. The extent to which this transplanted data would be applicable under Indian conditions is yet to be examined by the ISI concerned committee. The alternative is to use the option to organise indigenous feeding trials and toxicological studies to arrive at realistic threshold values/specification limits.

This paper discusses all these topical but very vital questions that face ISI technical committees on difficult grey-areas of far reaching significance. Barring work done on different aspects of perfumery/flavouring constituents and their methods of tests including olfactory and sensory evaluation no standardization has been attempted on flavours *per se*. Flavours being complex mixtures of organic compounds natural as well as synthetic in origin, created with the objective of imparting taste as well as pleasing fragrance, they also help to impart to processed foods, specific attributes such as acceptable texture, feel in the mouth or the overall satisfying and pleasing sensation. Thus far, it has been almost impossible to write such attributes in specifications objectively or in numerical system. The purpose of this paper is to highlight the gaps in knowledge and to seek the help of experts in evolving a tangible approach for standardization in the field of flavours.

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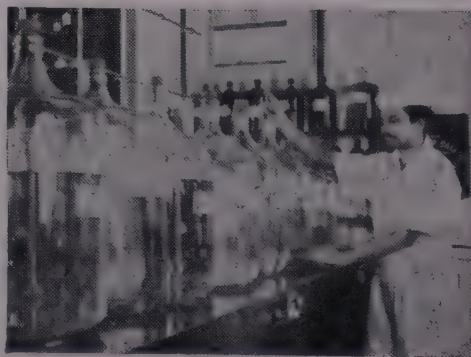
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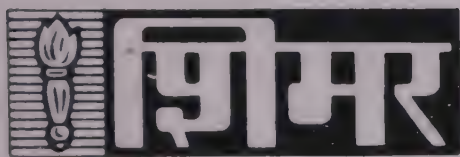
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